SECTION 200

EARTHWORK, LANDSCAPING AND EROSION CONTROL

SECTION 200. EARTHWORK, LANDSCAPING, EROSION CONTROL

General. Contact your District Office and Environmental Coordinator, check the Commitment File, read any permits (e.g. Section 404 or 401) and determine if there are any special right-of-way agreements that will restrict the Contractor's operation. Such agreements may include saving or removal of certain trees, hedges, or plantings, the moving or disposition of particular buildings, fences, walls or other structures or objects or protection of features within the ROW.

Before construction starts, arrange to have your supervisor go over the work with you. A Storm Water Pollution Prevention Plan (SWPPP), Form BDE 2342 may need to be developed or adjusted to accommodate the Contractor's operations and Form WPC 623, Notice of Intent, submitted to the Illinois Environmental Protection Agency (IEPA) to be in compliance with Illinois Laws. At the preconstruction conference, a jobsite inspection shall be scheduled with the Contractor. An Erosion Control Plan indicating the erosion control measures to be implemented on the project should be included in the plans. If not, one must be developed from a jobsite inspection with the Contractor. Any plans to preserve natural points of interest that may be incorporated in the ultimate development of the road for the convenience and comfort of the public can be reviewed at this time. Some erosion control measures, particularly perimeter barriers and those protecting sensitive areas or special items, must be installed before construction activities disturb existing ground conditions. Other measures will be installed as the work progresses.

SECTION 201. CLEARING, TREE REMOVAL AND PROTECTION, CARE AND REPAIR OF EXISTING PLANT MATERIAL

201.04 Tree Removal

You can determine which trees may be saved by studying the limits of the cut and fill slopes on the cross sections. Review the design files for right-of-way agreements that may require certain trees to be saved. The District Landscape Architect should be contacted for advice on tree removal questions. Identify each tree to be saved by a method acceptable to you and the Contractor. Record in your field book the location by stations, and the diameter in millimeter (inches), of each tree to be removed and paid for on the diameter basis. The plan locations and limits for Tree Removal, Hectare, (Acre), will be laid out in the field to assure the plan locations fit the field conditions.

Tree Removal, Special. This item is generally specified when trees are located in urban sections or present a special removal problem due to locations of houses, power lines, etc. Under this item the specific location of each tree should be shown.

201.05 Protection of Existing Plant Material

It is Departmental policy to preserve as many plantings as possible. In the event that any plantings designated to be saved are damaged by the Contractor, they shall be repaired or replaced by the Contractor at his/her expense.

The resident will review commitments to see which trees are to be saved, and discuss these requirements at the pre-construction meeting. Fencing or other appropriate protective barriers

shall be placed around trees or other sensitive areas, as noted in the plans, prior to beginning construction activities.

It may be possible to accommodate haul roads and staging areas through additional clearing or have the trees and shrubs replaced at the Contractor's expense. However, Residents will not permit Contractors to remove trees and shrubs, outside of designated clearing areas, for haul roads or staging areas without the review and approval of the District Landscape Architect. Questions regarding plant removal involving utility relocations should also be brought to the attention of the District Landscape Architect.

201.09 Disposal of Materials

Refer to Article 202.03 of the Standard Specifications before disposing of waste materials. Article 107.22 requires the contractor to designate all such areas for approval by the Engineer prior to their use. The contractor shall submit Form BDE 2289 with supporting documentation to the District Office for this purpose.

SECTION 202. EARTH AND ROCK EXCAVATION

Rock Cuts. Rock encountered in cut sections will require special attention. Consideration is to be given to modifying the typical cross section and profile grades to minimize the excavation. Each case must be considered individually. Safety, drainage and maintenance costs as well as construction costs are to be considered. Care is to be taken to excavate the rock at least 75 mm (3 inches) below the subgrade in a manner that will avoid water pockets.

Prior to adjusting the cross section when rock is encountered or variances are discovered in the plan elevations discuss the situation with your supervisor.

202.03 Removal and Disposal of Surplus, Unstable, and Unsuitable Materials and Organic Waste

1. A. Unstable or Unsuitable Material. If there is any question in your mind as to whether or not material is unstable or unsuitable, whether found in ordinary excavation or in the finished grade, refer the matter promptly to your supervisor.

   Article 107.22 requires the contractor designate all borrow, use and/or waste areas for approval by the Engineer prior to their use. The contractor should submit Form BDE 2289 with supporting documentation to the District Office for this purpose. It is essential that the Contractor file a written proposal for disposal of surplus waste materials along with the property owners' written permission. The Department, as generator of this waste, is liable even after removal from our property for all environmental statutes, archaeological and zoning requirements.

   The Contractor shall follow all State and Federal solid waste disposal laws, regulations and solid waste determinations of the Illinois Environmental Protection Agency.

B. Contaminated Soil. Should you encounter waste which may be considered a contaminate i.e. petroleum based products, paint material, pesticides, asbestos, herbicides, acids etc., it is imperative that your supervisor be contacted immediately.

The Contractor shall follow the guidelines as set forth by the IEPA in their removal and/or disposal.

Refer to Section 669 of the Standard Specifications addressing Removal and Disposal of Regulated Substances.

C. Make certain the Department has been issued an Open Burning Permit from the IEPA. Become familiar with the conditions of the permit. The Contractor shall follow the conditions as required. If the Contractor proposes to deviate from the conditions of the Departments permit, s/he shall secure a specific permit for any open burning on the contract.

202.05 Drainage

Refer to Construction Memorandum No. 60, Erosion and Sediment Control.

The condition of existing drainage lines may be valuable for future reference if noted on the as-built plans. Drainage outlets will be considered when establishing the flow line of culverts and ditches. It is advisable to replace all tile lines that extend across the roadway. If it is decided to replace the tile, it should be replaced with pipe conforming to the requirements for storm sewers. However, you will be required to locate the lines and then consult your supervisor before authorizing any replacement work.

202.07 Method of Measurement

Surplus or Deficiency of Excavation. The contract is to be constructed to the lines and grades shown on the plans. However, occasionally, either too much or an insufficient material is encountered on the contract. When this occurs, check the cross section as shown by the plans with the cross sections of the road as built before making your decision as to what should be done.

A. Excavation Beyond Plan Limits. The Specifications provide that any material excavated beyond the limits of the required slopes or excavated material used for purposes other than those designated, shall not be measured for payment. When excavating material that can be easily handled, a grading Contractor will sometimes make cuts wider and ditches deeper than called for on the plans. This should not be permitted unless the additional material is actually required and is approved by your supervisor.

B. Grading Sections. You must verify the plan cross sections prior to starting grading operations. Cross sections will be taken at all even stations, at points where there is a transition from cut to fill or vice versa, and wherever there is an abrupt change in the original ground line. When grading is completed, cross sections must be taken again at the same stations to complete the data for computation of quantities. During finishing operations, the Resident must require strict conformance with the 50 mm (2 in) tolerance contained in Article 212.02.

C. C. Previously Graded Sections must be recross-sectioned before they are paved.

SECTION 203. CHANNEL EXCAVATION

203.03 Clearing, Tree Removal, and Protection of Existing Plant Material.

Prior to starting any excavation involving waters of the U.S., check the Section 404 permits to determine the extent of work permissible under the conditions of the permit.

203.05 Method of Measurement

Measured quantities require cross sections before starting work and upon completion of the work. If the channel excavation is of sufficient length, segments of the work should be cross sectioned upon completion. This will avoid discrepancies in the amount of cubic meters (yards) removed due to changes which might occur during heavy rains or high water.

SECTION 204. BORROW AND FURNISHED EXCAVATION

204.02 Borrow Pits

Environmental reviews (Art. 107.22) are required for all borrow pits. You will forward the Contractor's submittals of Form BDE 2289 and other supporting documents to the District Office to obtain the necessary clearances. The contractor shall not disturb the borrow pit area, other than the minimum necessary to obtain samples, until clearance has been received.

SECTION 205. EMBANKMENT

205.04 Placing Material

If the embankment freezes during delays in the Contractor's operation, all frozen material must be removed from the embankment prior to resumption of the earth placing operation. The frozen material may be bladed over the slopes or placed in areas designated by the Engineer until the material can be reincorporated into the work after it has thawed. Any stockpiling should be protected in accordance with Section 280.

Large Rocks, Boulders, and Broken Concrete. Considerable care is required to place rocks, broken concrete or boulders in a fill to obtain satisfactory results. The fill must be deep enough to accommodate this material and the material must be distributed as widely as possible. The material shall be placed in specified lifts and distributed to permit the compaction of earth around and between the various pieces, and the filling of all voids. If material of this character is incorporated into the embankment, close inspection of the placement and compaction is required.

Shrinkage Factor. In computing the amount of excavation or borrow required to build an embankment, a percentage of excess material is allowed to account for volume differentials resulting from the effects of compaction. This percentage will vary greatly, depending on the character of the soil and the height of the embankment. All of the District Offices have tabulations of percentages of excess which cover the conditions in their particular District. However, the shrinkage factor for Furnished Excavation will be 25% or as stated in the contract, regardless of any tests which may be conducted at the time of construction.

Erosion and sediment control measures must keep pace with the construction of the embankment. Areas should be final graded and seeded at the earliest possible date, and all necessary maintenance regularly performed on perimeter and other control measures as required in Construction Memorandum No. 60, Erosion and Sediment Control.

205.05 Compaction

Disking. Note that the use of a disk is required on all material with the exception of sand or gravel. The function of the disk is primarily to mix the material, assist in the distribution of moisture and to pulverize the soil. Disking must at least penetrate through the entire depth of the currently placed material to be effective.

Moisture Content. Moisture plays an important part in successful compaction. Without the proper moisture content, the density required by the Standard Specifications may not be secured even though the embankment is subjected to additional rollings. When the moisture content of the material exceeds its optimum moisture content, to the extent that the required density cannot be obtained, it shall be allowed to dry out before additional material is placed, or the wet material may be incorporated with drier material provided satisfactory results obtained.

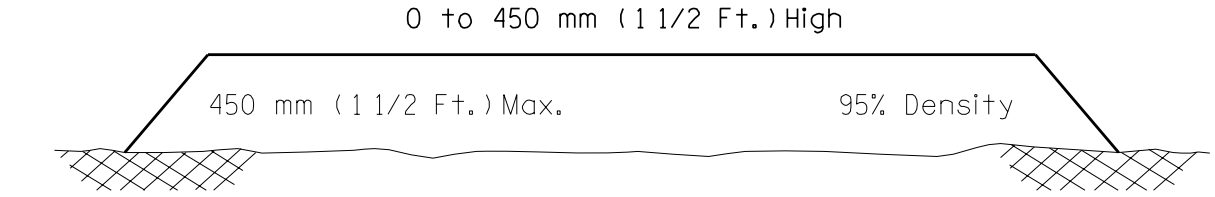
Density Requirements. Read Article 205.05 concerning density requirements. All density tests shall meet at least the minimum requirements of Article 205.05. If tests do not meet the minimum requirements, additional compactive effort shall be applied to bring the density up to the minimum Standard Specification requirements. No additional earth placement shall be permitted until the questionable areas are re-tested and approved by the Engineer.

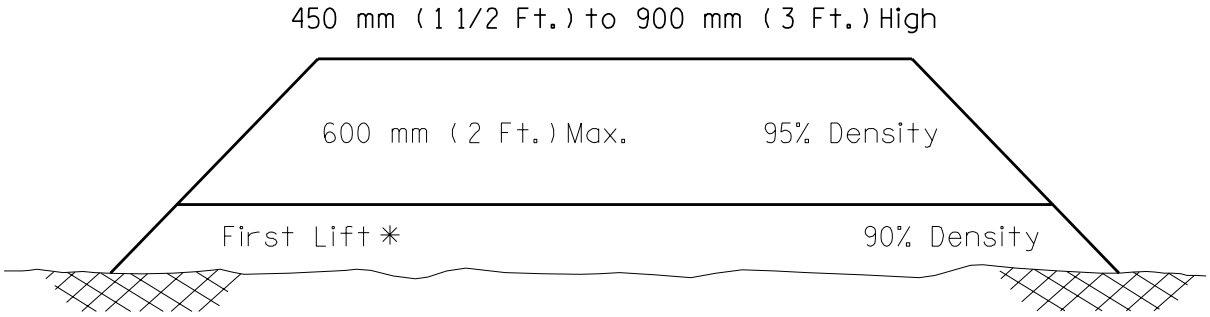
Tests. The District Materials Engineer will acquaint you with the procedure in making density tests.

Compaction Around Culverts, Bridges and Retaining Walls. The manner of placing embankment material around or behind structures may result in excessive pressure or settlement. To guard against displacement or undue settlement, material placed adjacent to structures must be properly compacted at a moisture content not in excess of 110 percent of optimum. You should carefully inspect the placement and compaction of material in places inaccessible to the roller method of compaction. The Contractor must place sufficient, properly compacted embankment over pipe culverts before crossing with earth moving equipment to prevent damage.

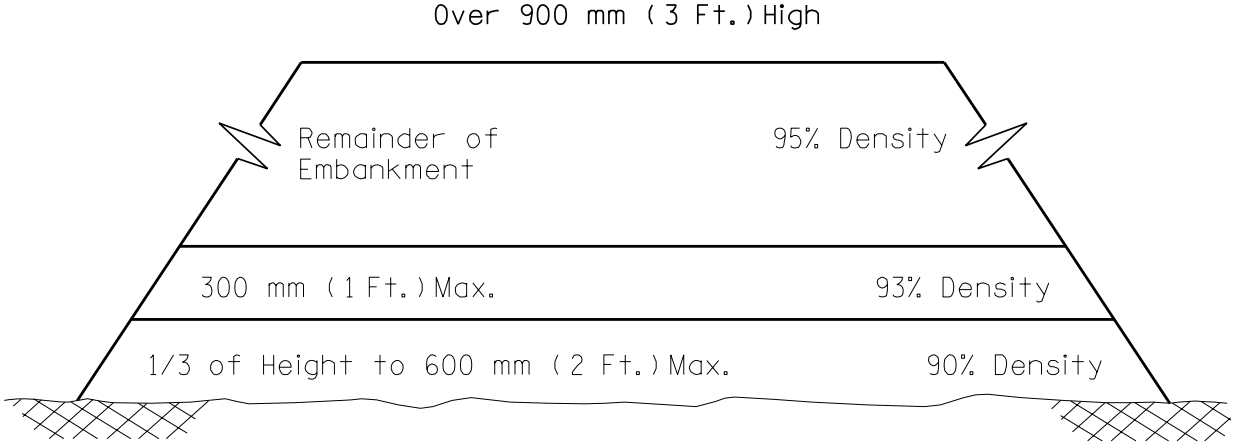
EMBANKMENT

Density Requirement





* A lift is considered as 200 mm (8 In.) of loose soil before compaction



EQUATIONS

$$\text{Shrinkage Factor (SF)} = \frac{\text{bank volume} - \text{compacted volume}}{\text{bank volume}}$$

$$= \frac{1 - \text{compacted volume}}{\text{bank volume}}$$

Unless otherwise stated in the contract, use SF = 0.25. Suitable Excavation is defined to be all Earth Excavation, Rock Excavation, and all other on-site excavation that is suitable to be used as Embankment for the contract.

To determine quantity of Embankment that will result from the suitable Excavation:

Excavation to be used as Embankment = Suitable Excavation x (1 – SF)

If the quantity of Excavation to be used as Embankment is less than the Embankment quantity required, the designer used one of the following equations to establish plan quantities:

Furnished Excavation = Embankment – [Suitable Excavation x (1 – SF)]

$$\text{Borrow Excavation} = \frac{\text{Embankment} - (\text{Suitable Excavation}) \times (1 - \text{SF})}{1 - \text{SF}}$$

The designer will show all areas of suitable material on a schedule in the plans. If any area cannot be used on a project containing Furnished Excavation or additional jobsite removal is done, the quantity of suitable Excavation and Furnished Excavation must be adjusted. On projects using Borrow Excavation, this is not required since payment is made for all material from the pit used on our project.

EXAMPLES

Example 1: Earthwork Schedule

1 Location	2 Earth Excavation	3 Earth Excavation Adjusted for Shrinkage	4 Embankment	5 Earthwork Balance Waste (+) or Shortage (-)
	Cubic Yard	Cubic Yard	Cubic Yard	Cubic Yard
Sta. 100+00 to 105+00	500	375	100	+275
Sta. 105+00 to 110+00	400	300	100	+200
Sta. 110+00 to 115+00	500	375	200	+175
Side Road A	200	150	300	-150
Total	1600	1200	700	+500

Column 1, 2 & 4 – Location and Quantities from cross sections

Cut = Earth Excavation Fill = Embankment

Column 3 - Quantity of Earth Excavation (Cut) Adjusted for a shrinkage factor of 0.25%

Column 5 - Earthwork required. (-) = Quantity of Fill or Embankment needed

(Furnished or Borrow Excavation), (+) = Quantity to be wasted

Since the Earth Excavation quantity is greater than Embankment needed, the only pay item is for Earth Excavation. No pay item for Borrow or Furnished Excavation is needed.

Pay Item

EARTH EXCAVATION = 1600 cubic yards

Example 2: Earthwork Schedule

1 Location	2 Earth Excavation	3 Earth Excavation Adjusted for Shrinkage	4 Embankment	5 Earthwork Balance Waste (+) or Shortage (-)
	Cubic Yard	Cubic Yard	Cubic Yard	Cubic Yard
Sta. 320+00 to 325+00	100	75	275	-200
Sta. 325+00 to 330+00	200	150	125	+25
Sta. 330+00 to 335+00	150	112.5	300	-187.5
Side Road X	50	37.5	250	-212.5
Total	500	375	950	-575

Column 1, 2 & 4 – Location and Quantities from cross sections

Cut = Earth Excavation Fill = Embankment

Column 3 - Quantity of Earth Excavation (Cut) Adjusted for a shrinkage factor of 0.25%

Column 5 - Earthwork required. (-) = Quantity of Fill or Embankment needed

(Furnished or Borrow Excavation), (+) = Quantity to be wasted

The Earth Excavation quantity is not great enough to account for all Embankment (Fill) needed. Therefore, additional earth is required from off-site either as Borrow or Furnished Excavation.

Furnished Excavation is measured in its final (compacted) state. Borrow Excavation is measured at the borrow site and therefore the Borrow quantity must allow for shrinkage (0.25%).

$$\text{Borrow} = \frac{575\ \text{CY}}{(1-.025)} = 766.67$$

Pay Items

EARTH EXCAVATION = 500 cubic yards
FURNISHED EXCAVATION = 575 cubic yards

OR

EARTH EXCAVATION = 500 cubic yards
BORROW EXCAVATION = 767 cubic yards

SECTION 208. TRENCH BACKFILL

208.03 Method of Measurement

If the trench has been excavated wider than the maximum width permitted by the specifications, the backfill material required for the excess excavation will not be measured for payment. The Contractor shall backfill this excess excavation with the same backfill material s/he uses for the pay portion of the trench. As an aid in computing the quantity of Trench Backfill refer to the Trench Backfill Table in the Documentation Section of this Manual. If the material excavated from the trench is used for backfilling, it is not measured for payment as Trench Backfill.

* These tables may be used only when the trench is at least as wide as allowed by the Standard Specifications. The volume of trench backfill will be less for narrower trenches. If any portion of the trench width, as required by the Standard Specifications, falls within the limits of the pavement or sidewalk for longitudinal runs, the entire width of the trench, up to the maximum width allowed by the Standard Specifications, will be paid for as Trench Backfill.

SECTION 211. TOPSOIL AND COMPOST

211.03 Furnishing and Excavating Topsoil

Do not assume the top of soil within the right-of-way is always suitable for topsoil.

Necessity for Topsoil. Topsoil will be specified on the plans if required. The purpose of topsoil is to provide a covering over the slopes that will support vegetation or protect a more erodible material. Review your plans and Special Provisions prior to starting excavation to determine the areas for topsoil removal. Stockpiles of top soil must also be treated in accordance with the Department's Erosion and Sediment Control policy.

211.04 Placing Topsoil and Compost

On slopes, in addition to raking and breaking of clods on the existing surface, to prevent slippage and to provide adequate bond, it is necessary to scarify the area preferably at right angles to the slope.

The time of placement of topsoil should be as close as possible to the time of the seeding operations.

SECTION 212. FINAL SHAPING, TRIMMING AND FINISHING

212.01 Description

You will note different types of surfacing require different operations in regard to shaping and trimming. Most of the operations are mentioned in the Specifications and others may be listed in the Special Provisions. Where the contract calls for surfacing on a pre-graded section, the shaping of backslopes is not required unless it is covered in the Special Provisions or the original slopes are disturbed.

SECTION 280. TEMPORARY EROSION CONTROL

Construction Memorandum No. 60 details the requirements of our Erosion and Sediment Control practices, including timely use of temporary and permanent measures. *All* projects which disturb soil, regardless of acreage of disturbance, require an Erosion and Sediment Control Plan. Weekly inspections, and supplemental inspections following 13 mm (0.5 inch) rain events, of the erosion control measures and areas subject to erosion are required on all projects. These inspections are to be documented on Form BC 2259 and included in the Erosion Control file. Most contracts will include pay items which the designers felt would adequately address the control of erosion on the project. The lack of pay items, however, does not relieve the Resident of responsibility for erosion control. When sufficient pay items are not included, the Resident will pay for necessary measures in accordance with Article 109.04. On projects disturbing more than 0.4 hectares (1 acre), Form BDE 2342, Storm Water Pollution Prevention Plan (SWPPP), will be included in the plans. Even on projects disturbing less area, an Erosion and Sediment Control Plan should be included in the plans. If an Erosion and Sediment Control plan is not present, the Department's representative and the Contractor are to cooperatively develop an erosion control plan using good engineering practices. (The Department is usually represented by the Landscape Architect, or the Erosion Control Coordinator, and the Resident.)

National Pollutant Discharge Elimination System (NPDES)

In compliance with the provision of the Illinois Environmental Protection Act, the Illinois Environmental Protection Agency (IEPA) has developed a general permit (ILR10) which addresses NPDES requirements for storm water discharge from construction site activities. This permit is required whenever a project results in the disturbance of 0.4 hectares (1 acre) or more of total land use. A Storm Water Pollution Prevention Plan will be supplied by Program Development to the Resident. The Resident is responsible for reviewing the plan and completing the sections which reflect the Contractor's specific operations. These sections include: Section 3. Maintenance; Section 5. Non-Storm Water Discharges.

The Contractor and all subcontractors involved with work items subject to the SWPPP are to certify that they understand and will comply with all the requirements of the permit by signing BDE 2342A, Contractor Certification Statement, included with the SWPPP.

The Resident must submit form WPC 623, Notice of Intent (NOI) (i.e., intent to use the general permit) form to the IEPA at least 48 hours before any disturbance of land commences and post a copy of the notice at the jobsite.

The Resident will conduct periodic inspections at least once every seven calendar days and within 24 hours of a storm that is 13 mm (0.5 inch) or greater, and record observations of the inspection on form BC 2259, NPDES/Erosion Control Inspection Report. Timely completion of these forms documents, in a manner acceptable to regulatory agencies, the department's efforts at permit compliance in the event of a failure of any portion of the Erosion and Sediment Control Plan. Send a copy of this form to the contractor. This provides evidence you notified the contractor of areas requiring maintenance.

In the event a failure of the erosion control system occurs, the Resident must complete and mail to the IEPA, within 5 days, a WPC 624, Incident of Non-compliance form. This form notifies the IEPA that a discharge of sediment into the surrounding area has occurred and the actions we took to mitigate this discharge. A copy of each ION must be kept with the Erosion Control file.

The Resident must complete the Form WPC 621, Notice of Termination (NOT) when final erosion control measures in accordance with the NPDES requirements are established. It is very important, therefore, that your Supervisor be kept informed.

A project which is designed with less than 0.4 hectares (1 acre) of disturbance but through added work or carelessness exceeds 0.4 hectares (1 acre) of disturbance during construction phase will require immediate implementation of NPDES provisions including NOI, ION and NOT submittals. These requirements become effective as soon as it is discovered that more than the threshold will be disturbed. The Resident does not wait until the contractor disturbs more than 0.4 hectares (1 acre).

Please review Construction Memorandum No. 60, Erosion and Sediment Control and Form BC 2259, NPDES/Erosion Control Inspection Report. Your District Landscape Architect or Environmental Coordinator can also assist with these requirements.